Fast Channel Dropping Filter Switch

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During the first two months of this program, we have completed the first two tasks, design of the grating and waveguide masks. We are currently optimizing the poling of a 4.5 μm period, which we plan to use in our device in Phase I. The 4.5 μm period provides a 15th order Bragg retroreflection for a wavelength of 1.3 μm The mask consists of a series of stripes with a 50% duty cycle, optimizing the efficiency of the grating reflection.

We have completed our waveguide mask design. This mask consists of a series of straight parallel waveguides with varying widths from 1.5 to 8 μm. The advantages of varying widths are twofold. First, different waveguide sizes enable us to test several wavelengths in single mode guides on the same device. The sensitivity of single mode operation to processing parameters is reduced, so we should be able to find a single mode waveguide for one of the widths. Higher order modes are undesirable, since the difference in the effective index between the modes causes a different wavelength for peak reflectivity for the two modes. Secondly, the effective index of the lowest order waveguide mode varies with the waveguide width as well. A measurement of the wavelength at peak reflectivity will enable us to measure the sensitivity of wavelength to waveguide width as well as processing parameters. We have decided not to work with a Y-branching waveguide structure at this time in order to focus on our basic understanding of the poled grating structure.

We are adding a grating characterization step to our program before we proceed with the waveguide fabrication on our device. In particular, we are examining the bulk Bragg reflection properties of the grating. This enables us to unambiguously characterize the grating itself without guided mode effects. We can then look at the reflection off the grating at different angles of incidence and measure the efficiency at lower Bragg diffraction orders.